ONTARIO MINISTRY OF ENVIRONMENT
36936000025471

OPERATING SUMMARY

ELMIRA

water pollution control plant

1967

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E455
1967
MOE

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

TD
367
.A56
E455
1967

Elmira : water pollution control plant.
82201

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET, TORONTO 5
OFFICE OF THE GENERAL MANAGER

Members of the Town of Elmira Local Advisory Committee,
Elmira, Ontario.

Gentlemen:

We are happy to present you with the 1967 Operating Summary for the Elmira Water Pollution Control Plant, OWRC Project No. 2-0096-61.

Your co-operation with our staff throughout the year has been appreciated. Only with such co-operation can the war against water pollution be waged effectively.

Yours very truly,

D. S. Caverly,
General Manager.

LIB [illegible]
F[illegible] 1969
ONTARIO WATER
RESOURCES COMMISSION

#1

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN
J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER
W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to submit to you the 1967 Operating Summary for the Elmira Water Pollution Control Plant, OWRC Project No. 2-0096-61.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

D McTavish

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

D
27
55
38
67
0E
CVX

FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

CONTENTS

Foreword 1
Title Page 3
'67 Review 5
Project Costs 6
Operating Costs 7
Process Data 9
Conclusions . . . . Inside back cover

Environment Ontario
Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
Canada

ELMIRA

water pollution control plant

operated for

THE TOWN OF ELMIRA

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M. P. P.

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K. H. Sharpe
F. A. Voege
A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: B. W. Hansler

801 Bay Street Toronto 5

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'67 REVIEW

A total of 253.549 mgd of sewage was treated during the year representing a 25 percent increase in flows to the sewage treatment plant over the previous year. As a result of the increased flows, the cost per million gallons treated and the cost per pound of BOD removed decreased respectively from $226.40 to $161.82 and 10 cents to 7 cents.

The average BOD and suspended solids of 44 ppm and 60 ppm in the final effluent was a considerable improvement over the previous year's BOD and suspended solids average final effluent. However, the effluent quality still did not meet OWRC objectives of 15 ppm for BOD and suspended solids. The poor efficiency can be attributed to the industrial waste from UniRoyal Limited.

The digester operation was terminated earlier in the year because of the corrosive nature and the poor treatability of the raw sludge. The sludge caused considerable corrosion inside the digester and was very difficult to reduce biologically, resulting in poor methane gas production.

PROJECT COSTS

NET CAPITAL COST (Estimated)		$582,424.56
DEDUCT - Payments from Municipalities	$100,085.00	
- Portion Financed by CMHC (Estimated)	388,449.01	488,534.01
Long Term Debt to OWRC		$ 93,890.55
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967		$ 6,248.31
Net Operating		$ 41,031.41
Debt Retirement		1,934.00
Reserve		3,629.64
Interest Charged		5,296.65
TOTAL		$ 51,891.70

RESERVE ACCOUNT

Balance at January 1, 1967	$ 5,376.11
Deposited by Municipality	3,629.64
Interest Earned	358.08
	$ 9,363.83
Less Expenditures	(2,890.09)
Balance at December 31, 1967	$ 6,473.74

MONTHLY OPERATING COSTS

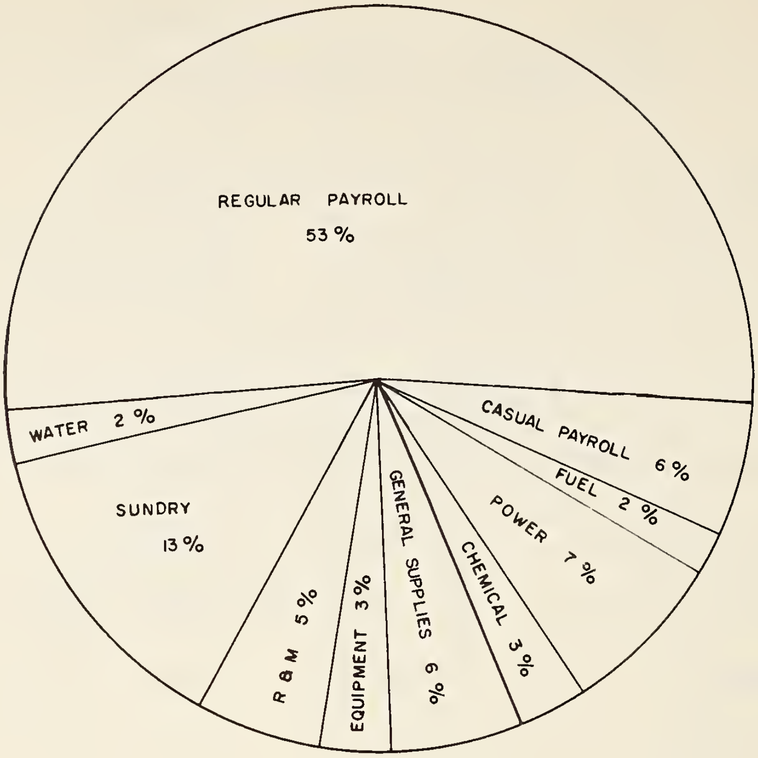
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	2,467.97	1227.09	347.26	238.73	286.65		56.87	11.45	84.01	75.95	139.96
FEB	2,397.77	1227.09	310.78	179.93	271.06	175.87	166.55		54.73	11.76	
MARCH	4,295.49	2076.63	414.04	147.93	262.75		135.46	162.48	521.75	443.13	131.32
APRIL	2,934.58	1708.30	358.30	69.98	267.93	228.38	78.79	105.15	43.66	74.09	
MAY	2,825.51	1911.69	214.39	58.13	254.87		83.32	133.60	.09	42.50	126.92
JUNE	3,691.07	1724.01	273.81	44.33	243.43	228.38	324.81	156.45		695.85	
JULY	4,469.20	1773.75	339.95		248.19		190.16		209.61	1547.67	159.87
AUG	3,017.38	1749.23	118.30		207.71	2.91	189.74	336.48	105.94	262.07	
SEPT	4,609.63	2678.61			199.62		298.00	339.31	528.69	390.01	175.39
OCT	2,524.85	1791.59		12.94	223.69		143.07		55.58	297.98	
NOV	3,488.42	1804.13		59.17	241.35		230.41	12.12	123.43	825.14	192.67
DEC	4,309.54	1820.58		143.03	246.55	466.99	413.93	16.04	380.91	821.51	
TOTAL	41,031.41	21537.70	2376.83	954.17	2953.80	1102.53	2311.11	1273.08	2108.40	5487.66	926.13

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $2,933.00

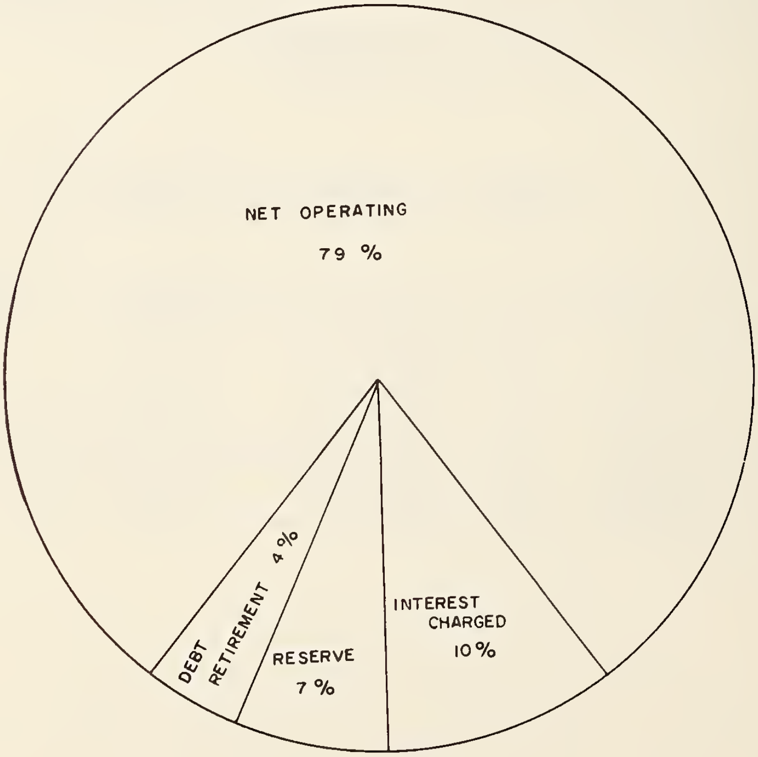
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1965	158.409	$26960.67	$170.20	16 CENTS
1966	202.882	45931.52	226.40	10 CENTS
1967	253.549	41031.41	161.82	7 CENTS

1967 OPERATING COSTS



TOTAL ANNUAL COST



Process Data

FLOWS

Flow data representing Town sewage, UniRoyal industrial waste and combined wastes on a monthly average basis and on a probability basis are plotted on the accompanying graphs.

The average daily flow from the Town increased from .445 mgd in 1966 to .548 mgd in 1967. The design flow of .5 mgd was exceeded only 50 percent of the time indicating that most of the high flows were concentrated in a relatively short period of time. This is shown clearly in the average daily flow graphs for the Town.

The average daily flow from UniRoyal increased from .110 mgd to .146 mgd from 1966 to 1967. The design flow of .180 mgd was exceeded 40 percent of the time in 1967 compared to only 25 percent of the time in 1966.

The combined average daily flow to the plant of .694 mgd was 102 percent of the design flow of .680 mgd. The design flow was exceeded 46 percent of the time.

OPERATING SUMMARY

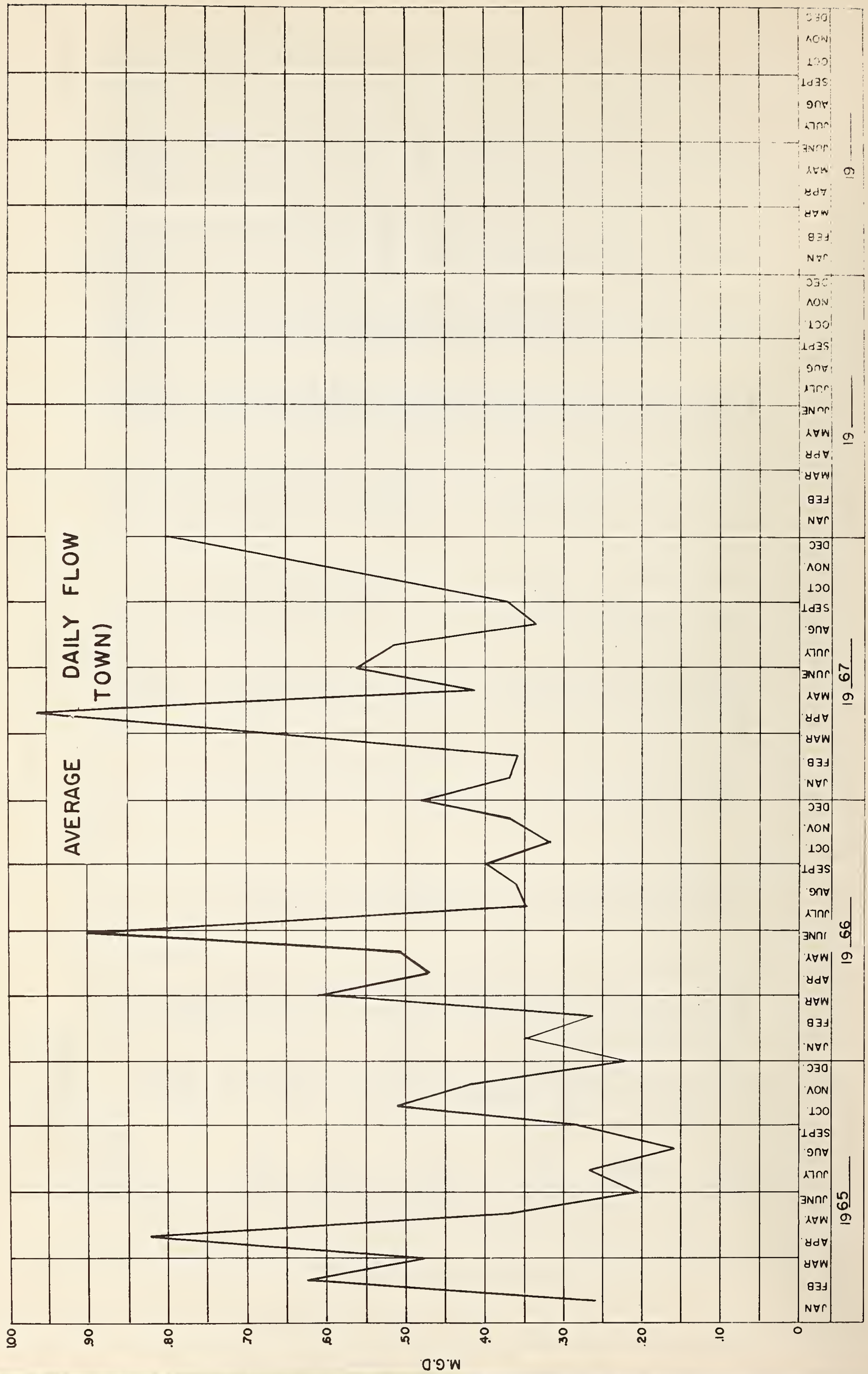
Week	TOWN			UNIROYAL			COMBINED				
							Raw			Final	
Ending	Flow MG	BOD	SS	Flow MG	BOD	SS	Flow MG	BOD	SS	BOD	SS
Jan. 7	1.963	129	148	.855	635	108	2.818	296	255	78	100
14	1.773	193	298	1.031	1150	111	2.804	385	242	82	74
21	1.585	171	196	1.073	618	146	2.658	352	174	55	121
28	4.838	91	198	1.074	800	134	5.912	305	189	50	88
Feb. 4	1.798	131	171	1.149	703	87	2.947	326	214	67	93
11	2.098	130	138	1.239	888	140	3.337	448	135	95	91
18	3.870	158	213	1.236	980	142	5.106	453	195	92	77
25	2.450	158	161	1.146	673	206	3.596	305	135	79	73
Mar. 4	2.301	155	383	1.305	587	173	3.606	357	211	180	131
11	2.531	198	240	1.271	631	138	3.802	362	284	175	153
18	5.518	101	113	1.330	540	82	6.848	194	107	83	109
25	3.470	159	227	1.317	720	144	4.787	310	155	93	107
Apr. 1	11.023	58	57	1.159	755	183	12.182	207	90	34	70
8	9.743	53	66	1.356	425	95	11.099	176	41	40	40
15	8.011	101	69	1.484	617	43	9.495	245	92	51	55
22	5.325	75	125	1.342	547	106	6.667	173	107	31	57
29	4.137	133	128	1.310	725	92	5.447	288	150	24	63
May 6	3.386	94	173	1.270	712	72	4.656	233	159	36	42
13	3.165	201	180	1.250	525	90	4.415	275	172	55	85
20	2.800	140	127	1.050	483	38	3.850	298	171	48	71
27	2.600	132	206	1.190	640	41	3.790	314	141	48	58
June 3	2.100	181	256	.950	700	86	3.050	311	185	41	56
10	2.800	147	202	.700	660	43	3.500	260	178	32	39
17	2.550	112	141	1.010	453	23	3.560	138	111	28	37
24	3.676	118	229	1.028	533	32	4.704	166	144	12	21

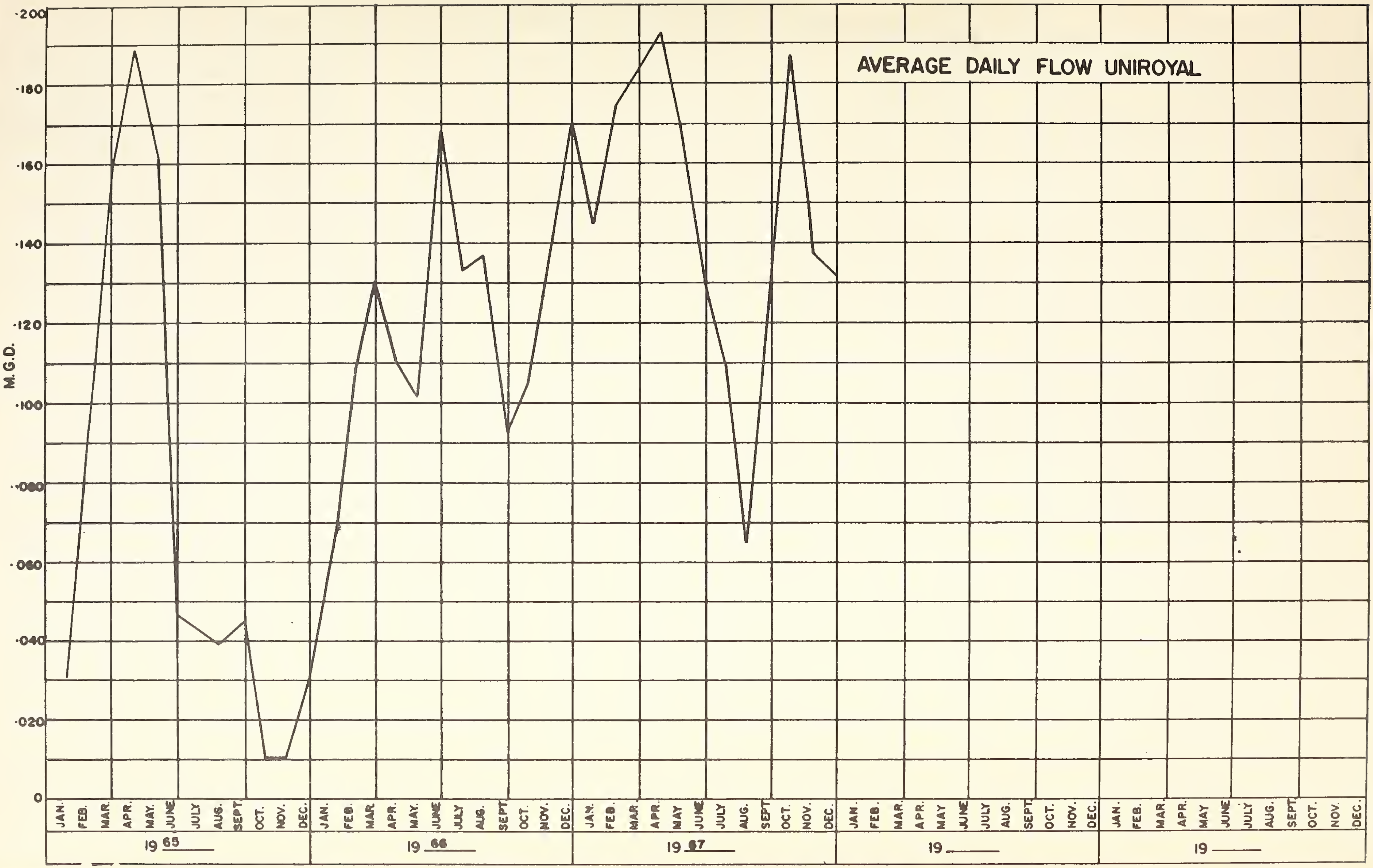
July	2	7.882	56	75	.985	586	29	8.866	185	76	33.1	19
	8	6.273	63	44	.940	455	64	7.213	200	105	102	33
	15	3.002	125	86	.955	770	84	3.957	305	113	12.8	40
	22	2.802	227	226	.761	470	22	3.563	273	143	20	72
	29	2.426	125	141	.524	619	61	2.950	234	81	17	36
Aug.	5	2.164	152	156	.431	572	53	2.595	275	108	16	23
	12	2.273	123	435	.450	465	70	2.723	227	591	8.3	31
	19	2.105	126	153	.373	352	129	2.478	257	128	10	26
	26	2.182	115	179	.410	278	100	2.592	124	80	11	51
Sept.	2	2.844	122	124	.659	670	28	3.503	175	101	10	31
	9	2.050	189	187	.653	450	51	2.703	238	151	12	55
	16	2.000	147	247	.928	307	49	2.928	210	205	18	53
	23	3.050	114	201	.908	417	52	3.958	167	207	13	34
	30	3.300	116	139	1.173	418	43	4.473	308	182	28	38
Oct.	7	2.577	190	166	1.440	807	108	4.017	461	194	32	47
	14	2.232	94	189	1.367	508	97	3.599	288	213	32	60
	21	6.456	68	111	1.322	467	122	7.778	204	136	14	47
	28	3.254	97	167	1.192	538	48	4.446	239	130	48	36
Nov.	4	4.950	119	187	1.068	673	216	6.018	240	229	48	61
	11	4.820	119	174	1.077	552	76	5.897	300	261	49	49
	18	4.557	134	170	.936	877	79	5.493	285	178	38	74
	25	4.283	109	134	.817	727	101	5.100	245	125	39	55
Dec.	2	3.234	167	230	1.003	893	94	4.237	288	130	31	70
	9	4.739	110	182	1.180	900	233	5.919	370	175	32	40
	16	5.362	78	136	.667	470	77	6.029	144	156	26	49
	23	8.385	107	144	.817	575	77	9.202	152	113	20	52
	30	5.096	62	144	1.045	380	46	6.141	94	100	21	44
	31	.384	-	-	.150	-	-	.534	-	-	-	-
Total		200.193	18616	24898	53.356	89476	13796	253.549	28158	22923	6220	8474
Average		.548	130 ***	174 ***	.146	639 *	99 *	.694	267 ***	160 ***	44 **	60 **

* 140 samples.

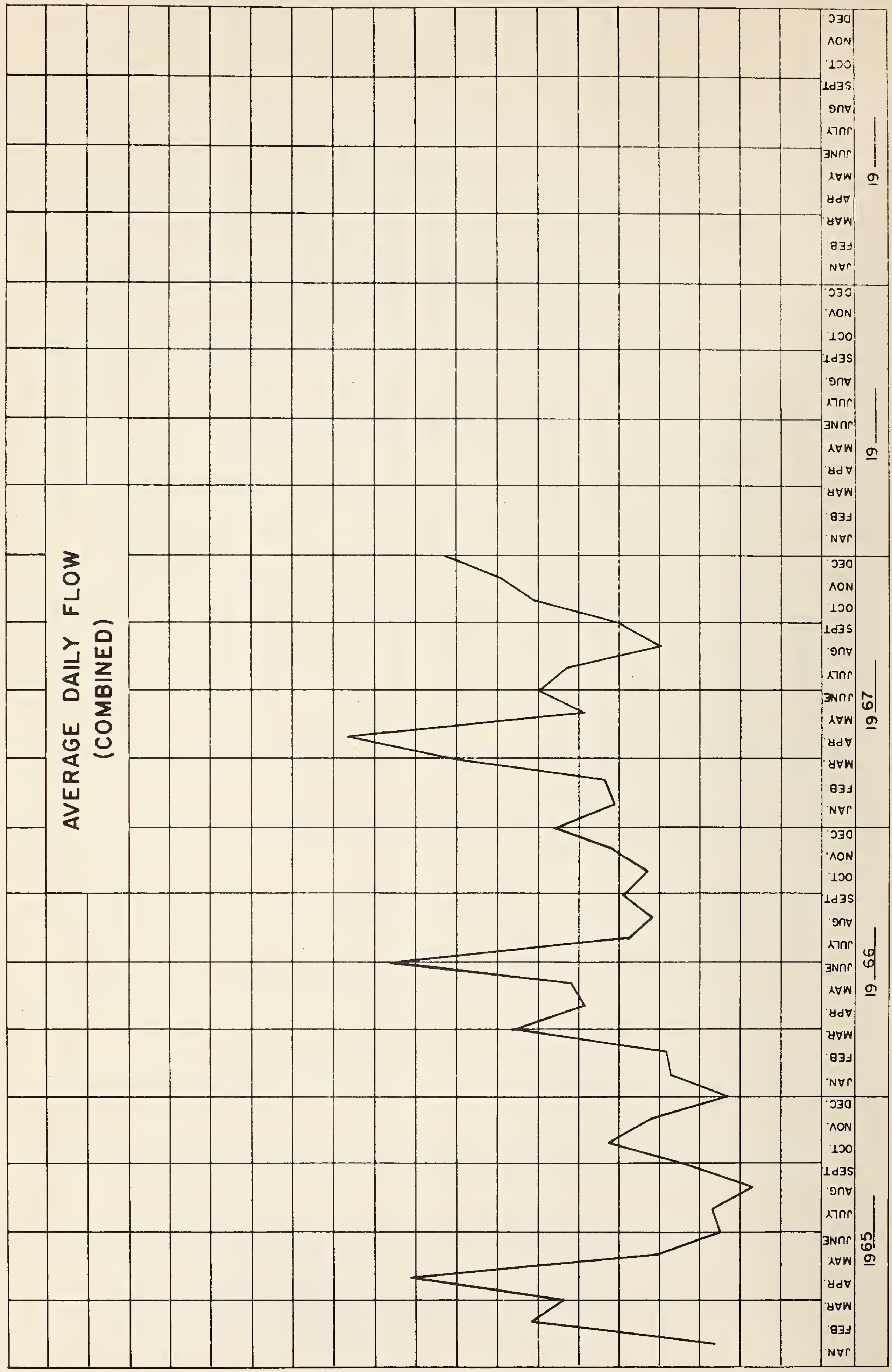
** 141 samples.

*** 143 samples.


AVERAGE DAILY FLOW
TOWN)
M.G.D
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
JAN FEB MAR APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
1965
JAN. FEB MAR APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 66
JAN. FEB. MAR APR. MAY JUNE JULY AUG. SEPT OCT NOV. DEC
19 67
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
19
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
19



AVERAGE DAILY FLOW UNIROYAL


AVERAGE DAILY FLOW
(COMBINED)
M.G.D.
2.000
1.800
1.600
1.400
1.200
1.000
.800
.600
.400
.200
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JAN.
FEB.
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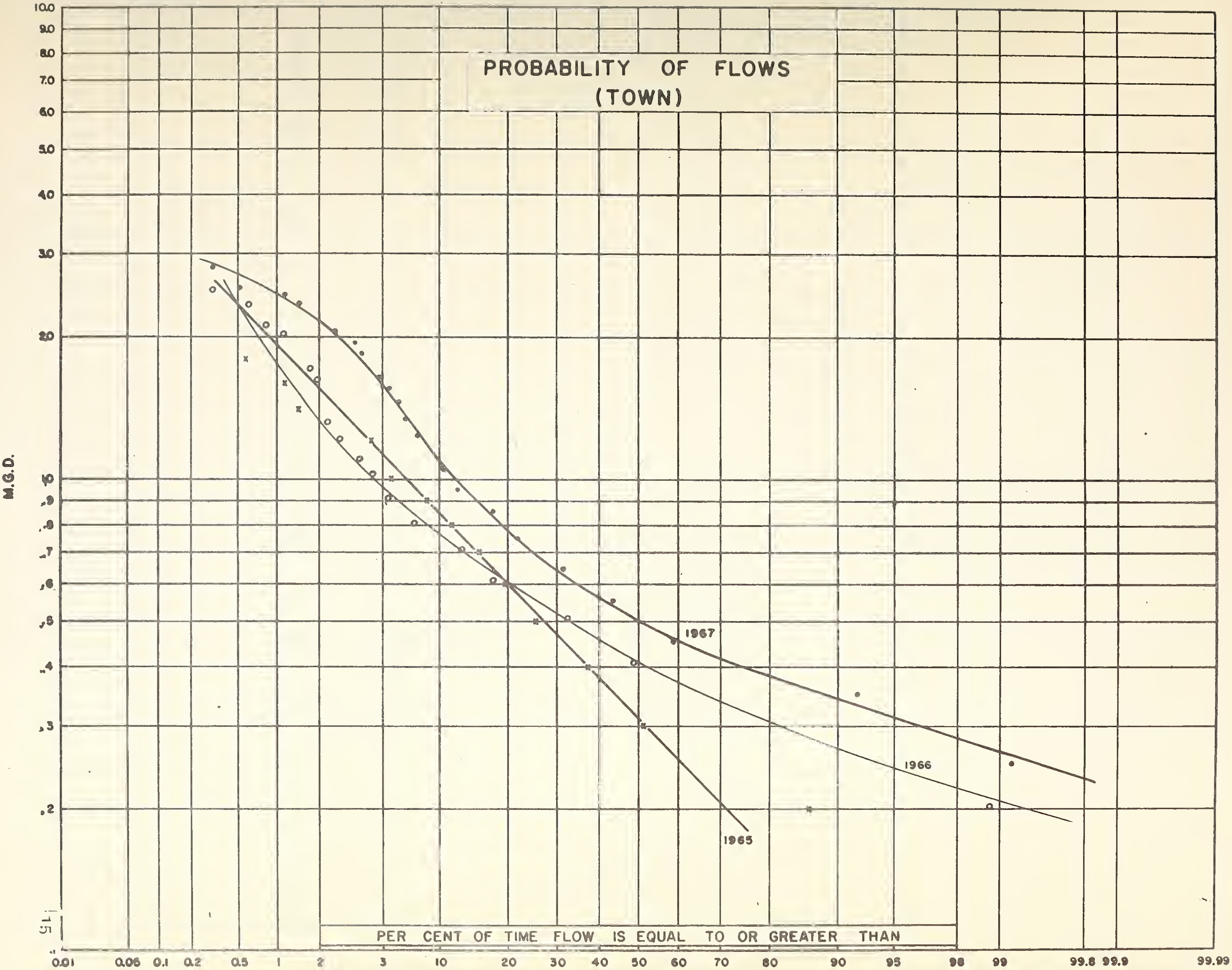
APR.
MAY.
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
1965
19 66
19 67
19
19


PROBABILITY OF FLOWS
(TOWN)
M.G.D.
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
1967
1966
1965
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
0.01
0.05
0.1
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0.5
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70
80
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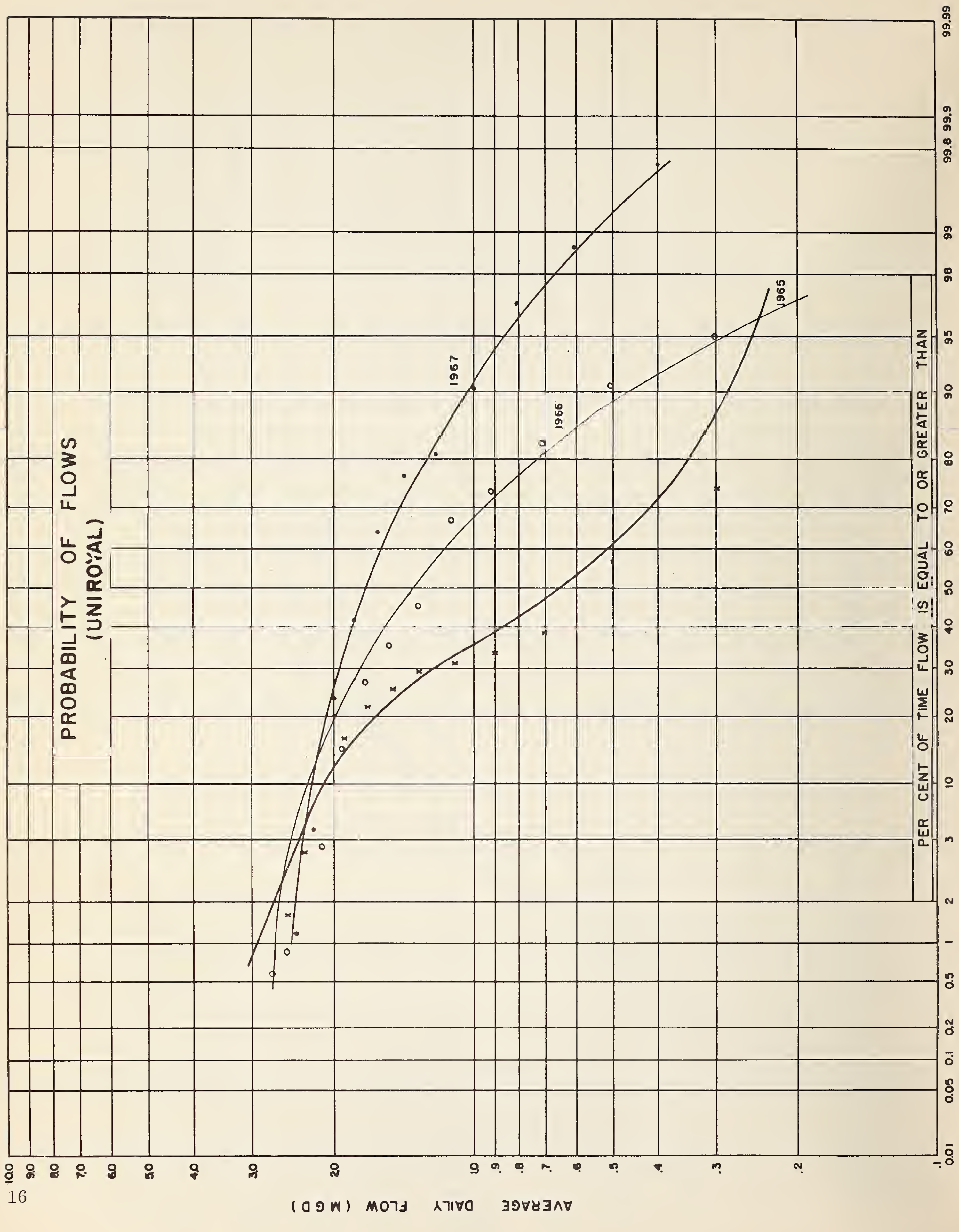
95
98
99
99.8
99.9
99.99


PROBABILITY OF FLOWS
(UNIROYAL)
1965
1966
1967
AVERAGE DAILY FLOW (M G D)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
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PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
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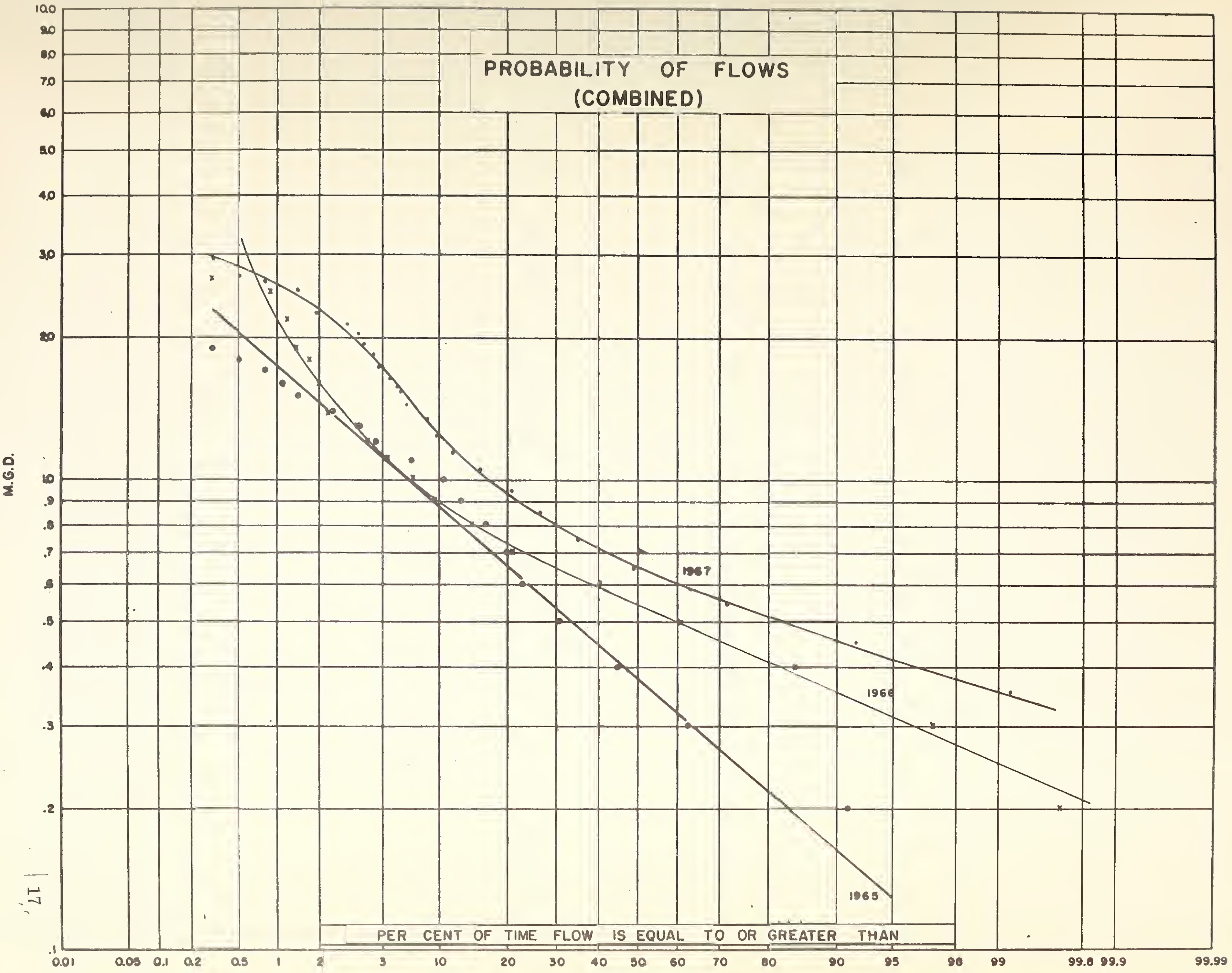
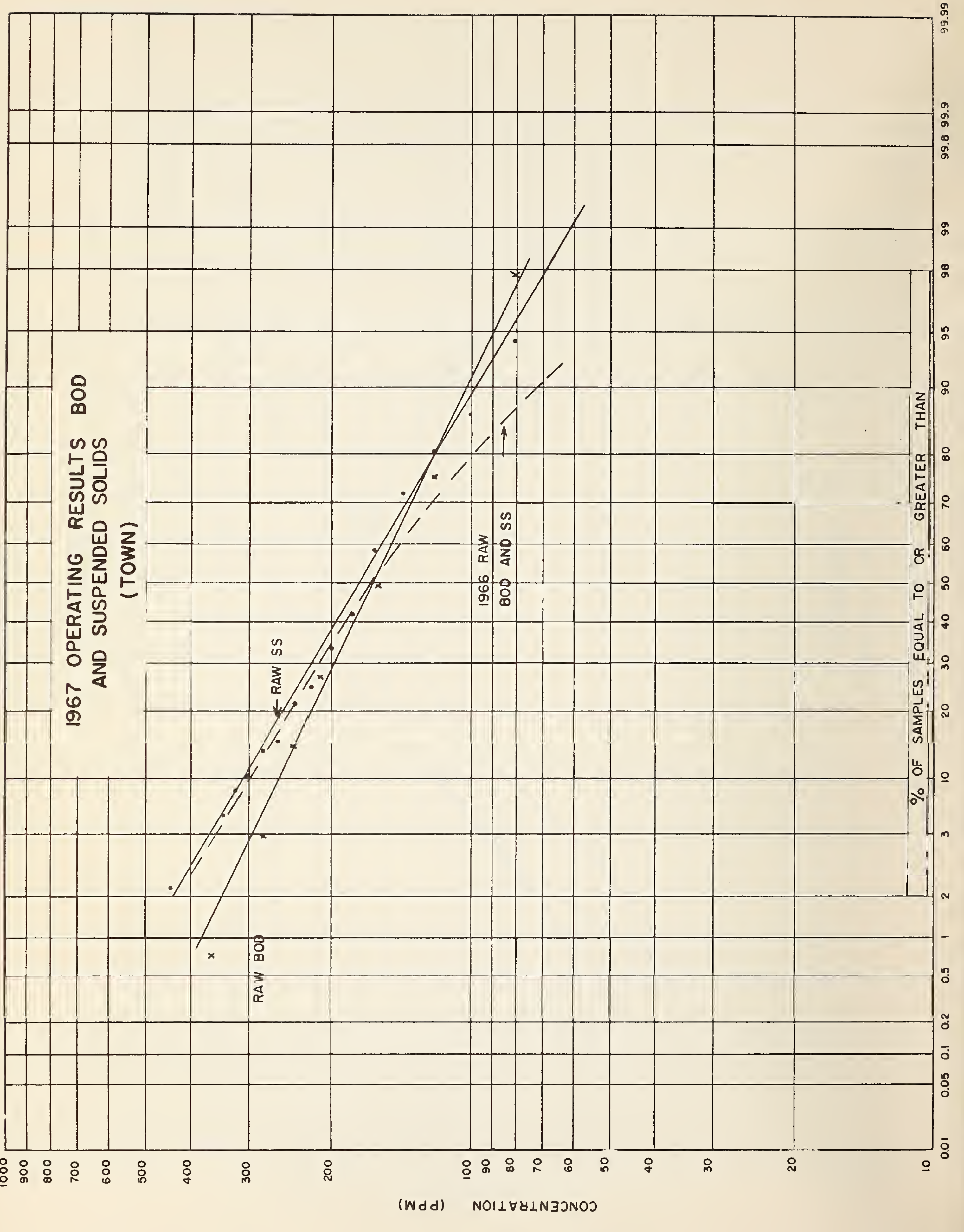
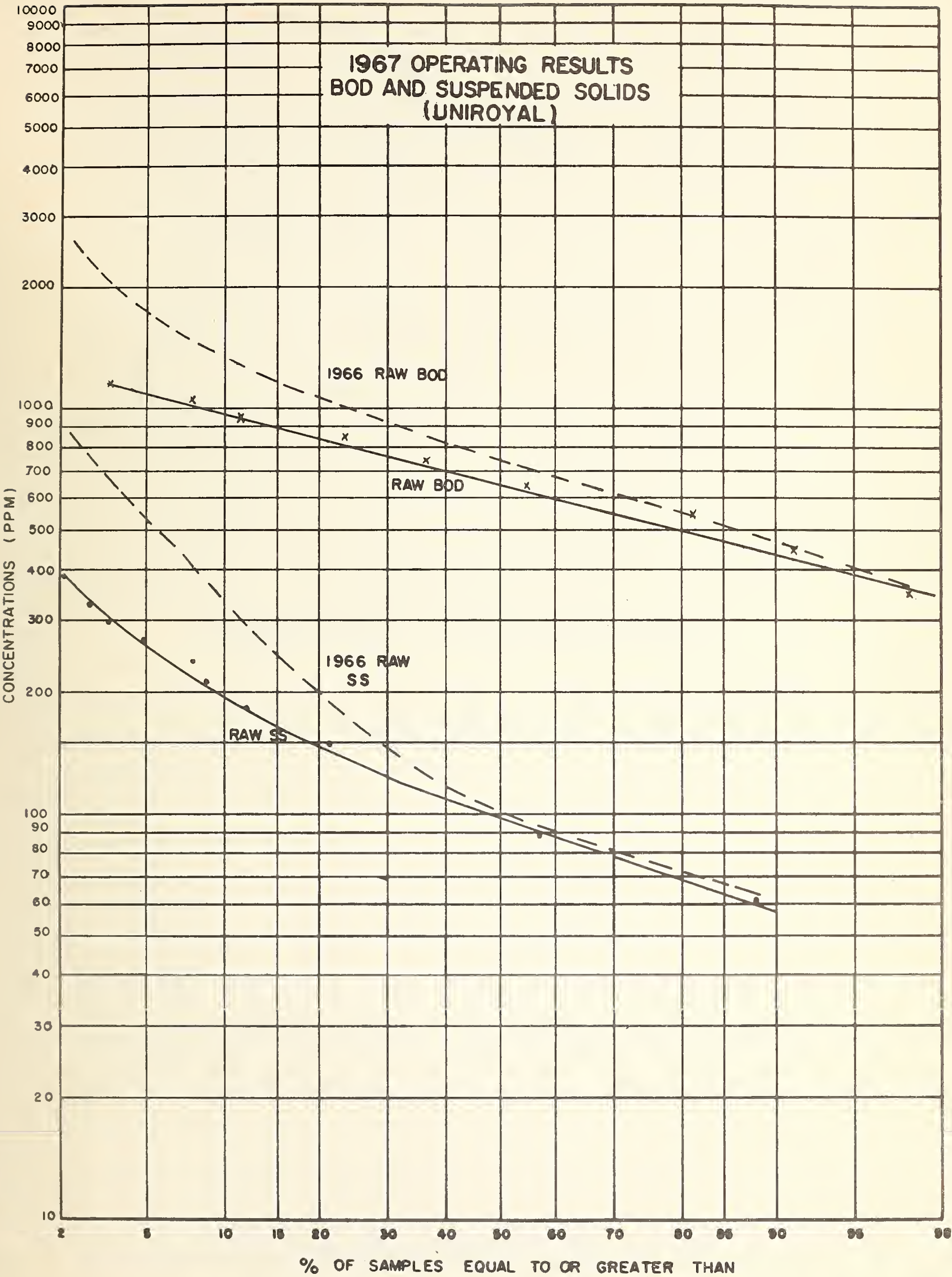
99.99



PROBABILITY OF FLOWS (COMBINED)


1967 OPERATING RESULTS BOD
AND SUSPENDED SOLIDS
(TOWN)
RAW SS
RAW BOD
1966 RAW
BOD AND SS
% OF SAMPLES EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
CONCENTRATION (PPM)
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10


1967 OPERATING RESULTS
BOD AND SUSPENDED SOLIDS
(UNIROYAL)
1966 RAW BOD
RAW BOD
1966 RAW SS
RAW SS
CONCENTRATIONS (PPM)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
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2
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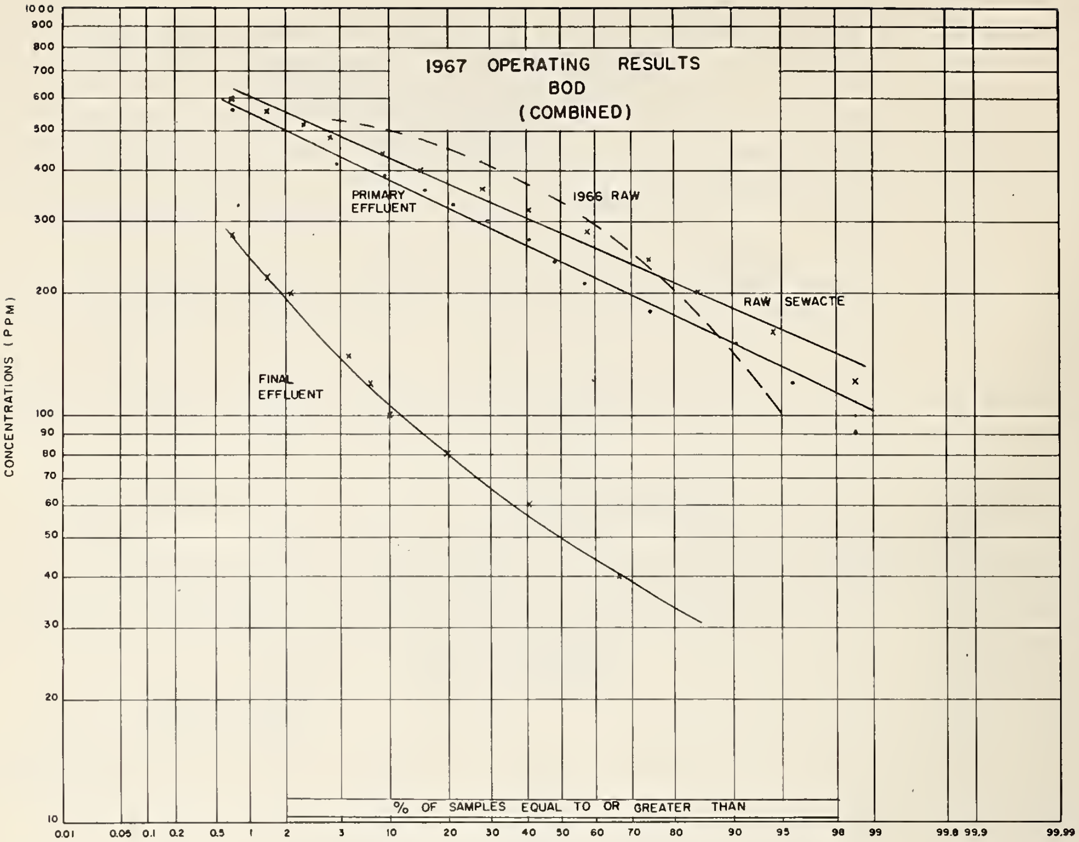
85
90
95
98
% OF SAMPLES EQUAL TO OR GREATER THAN


1967 OPERATING RESULTS
BOD
(COMBINED)
1966 RAW
PRIMARY EFFLUENT
RAW SEWACTE
FINAL EFFLUENT
CONCENTRATIONS (PPM)
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
% OF SAMPLES EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
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50
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70
80
90
95
98
99
99.8
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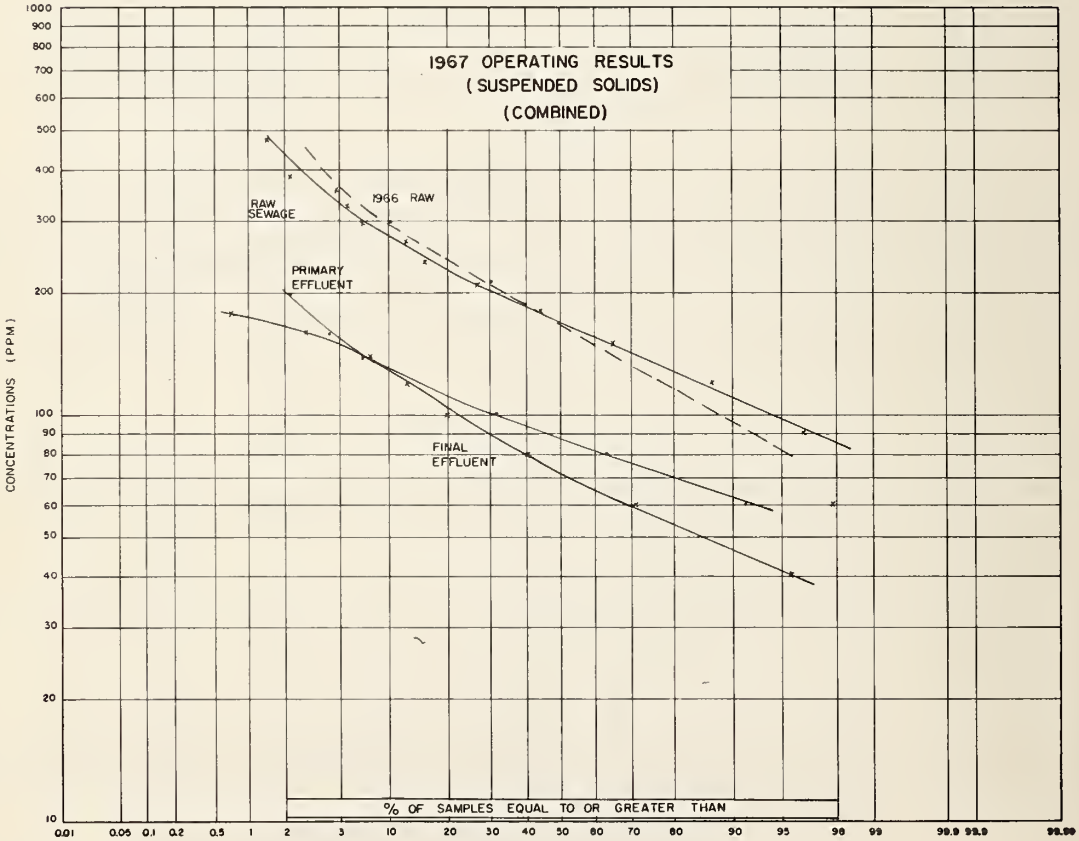
99.99


1967 OPERATING RESULTS
(SUSPENDED SOLIDS)
(COMBINED)
RAW SEWAGE
1966 RAW
PRIMARY EFFLUENT
FINAL EFFLUENT
CONCENTRATIONS (PPM)
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
% OF SAMPLES EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
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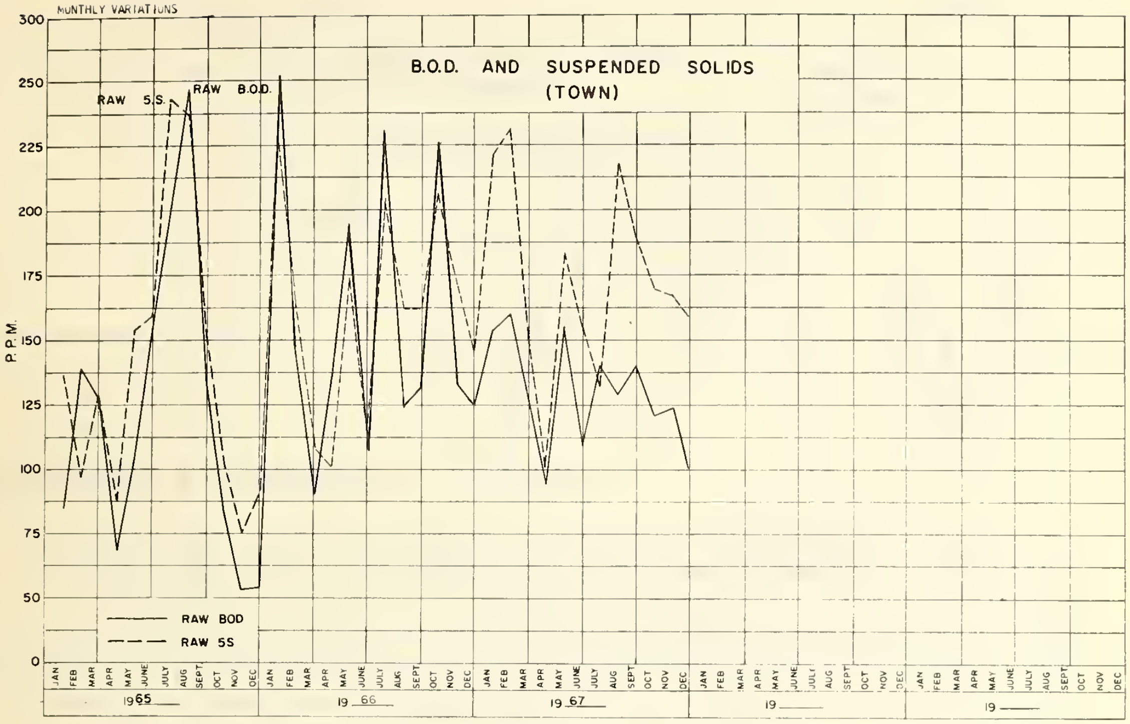
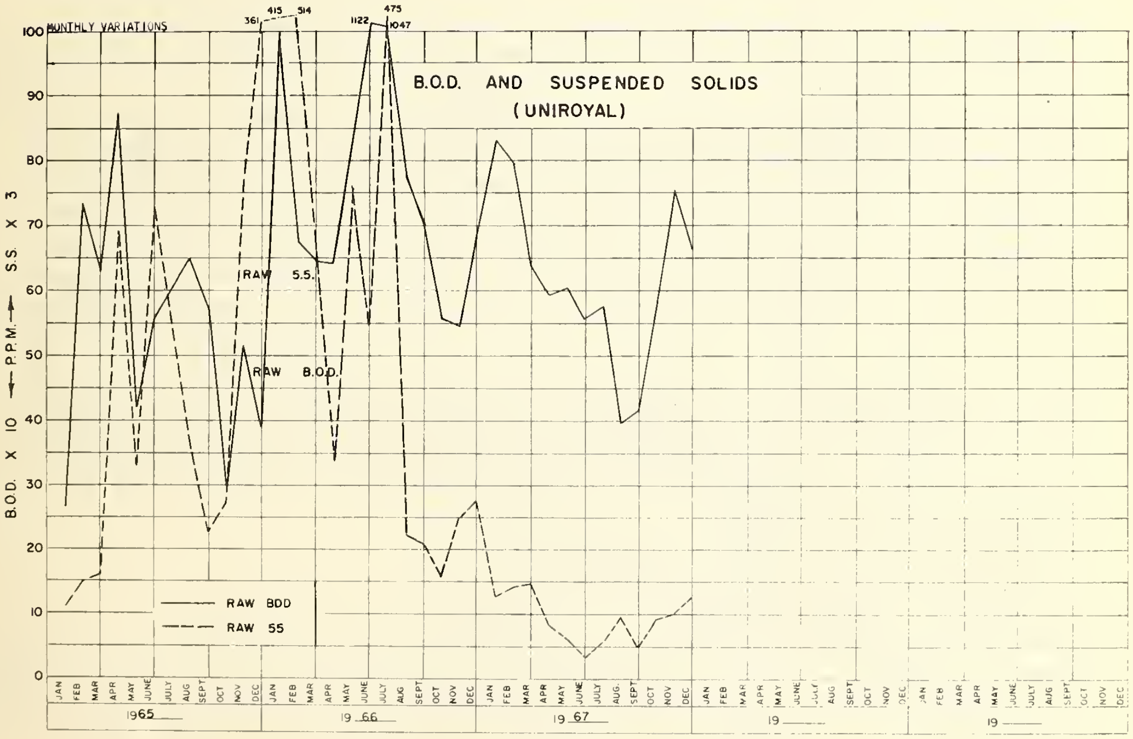
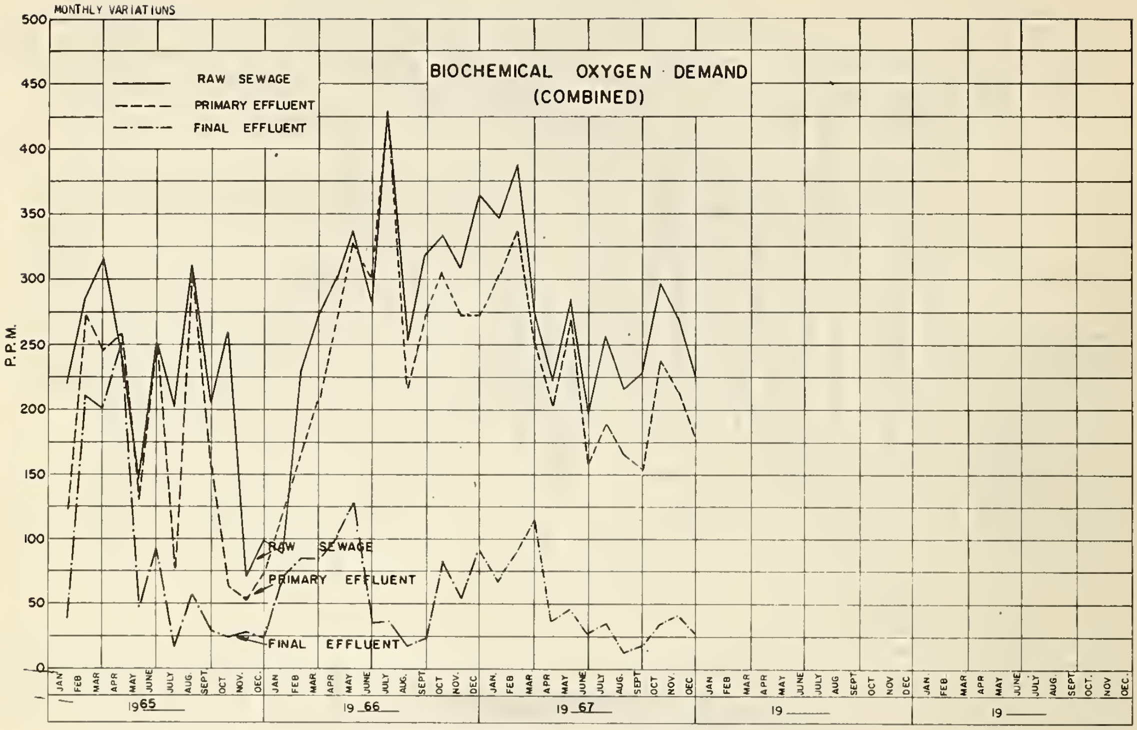
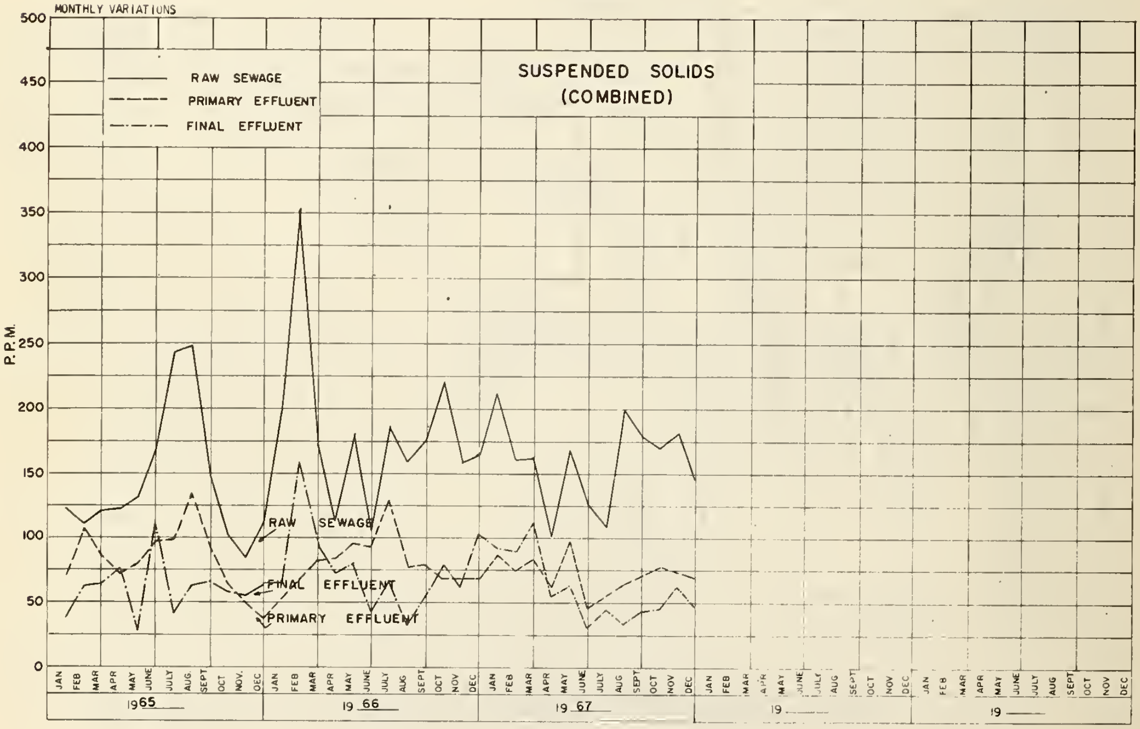


MONTHLY VARIATIONS





MONTHLY VARIATIONS



GRIT, BOD and SS REMOVAL

Total tons removed:	BOD	409.5
	Suspended Solids	126.8

AVERAGES PER MONTH

	Influent	Effluent	% Reduction	Tons Removed
BOD	267	44	83.5	34.1
Suspended Solids	160	60	62.5	10.6

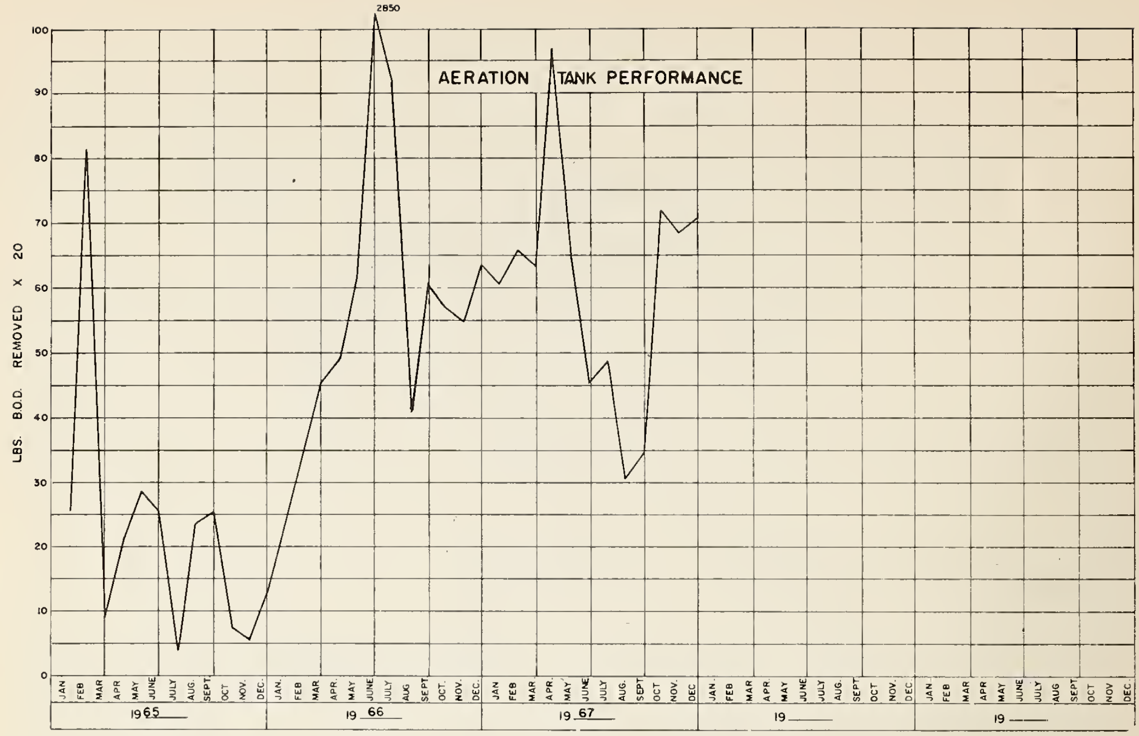
GRIT, B.O.D AND S.S. REMOVAL – COMMENTS

The average BOD concentration of the Town sewage was 130 ppm, a decrease of 24 ppm from the previous year. The BOD design concentration of 170 ppm was exceeded only 46 percent of the time. The average suspended solids concentration of the Town sewage was 174 ppm representing an increased concentration of 11 ppm over the previous year. The design concentration for suspended solids of 300 ppm was exceeded only 11 percent of the time.

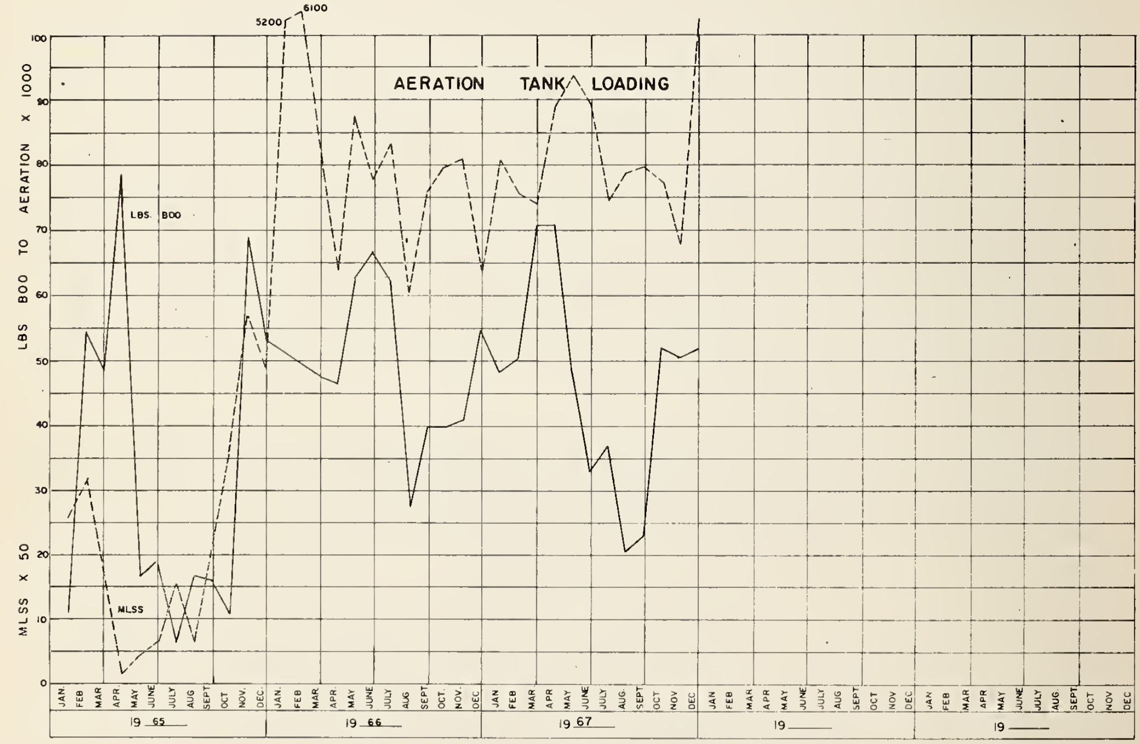
The average BOD concentration from UniRoyal of 639 ppm represents a decrease loading of 17.8 percent over from the previous year. The design concentration of 1100 ppm was exceeded only 4.7 percent of the time. The average suspended solids concentrations from UniRoyal wastes was 99 ppm representing a decrease of 46.5 percent in suspended solids concentration over the previous year. The design concentration for suspended solids of 320 ppm was exceeded only 3.3 percent of the time.

The average BOD concentration of the combined influent of 267 ppm was 63.5 percent of the design concentration of 420 ppm. The average BOD concentration in 1966 represented 72 percent of the design concentration. The design BOD concentration was exceeded 11.5 percent of the time. The average suspended solids concentration of the combined influent of 160 ppm represents 52.3 percent of the design concentration. The design suspended solids concentration of 306 ppm was exceeded approximately 7 percent of the time.

The average plant effluent BOD and suspended solids concentrations were respectively 44 ppm and 60 ppm during the year. The OWRC objective of 15 ppm was not met at any time during the year.



AERATION TANK PERFORMANCE
LBS. B.O.D. REMOVED X 20
2850
0
10
20
30
40
50
60
70
80
90
100
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT NOV. DEC.
1965
1966
1967
19
19



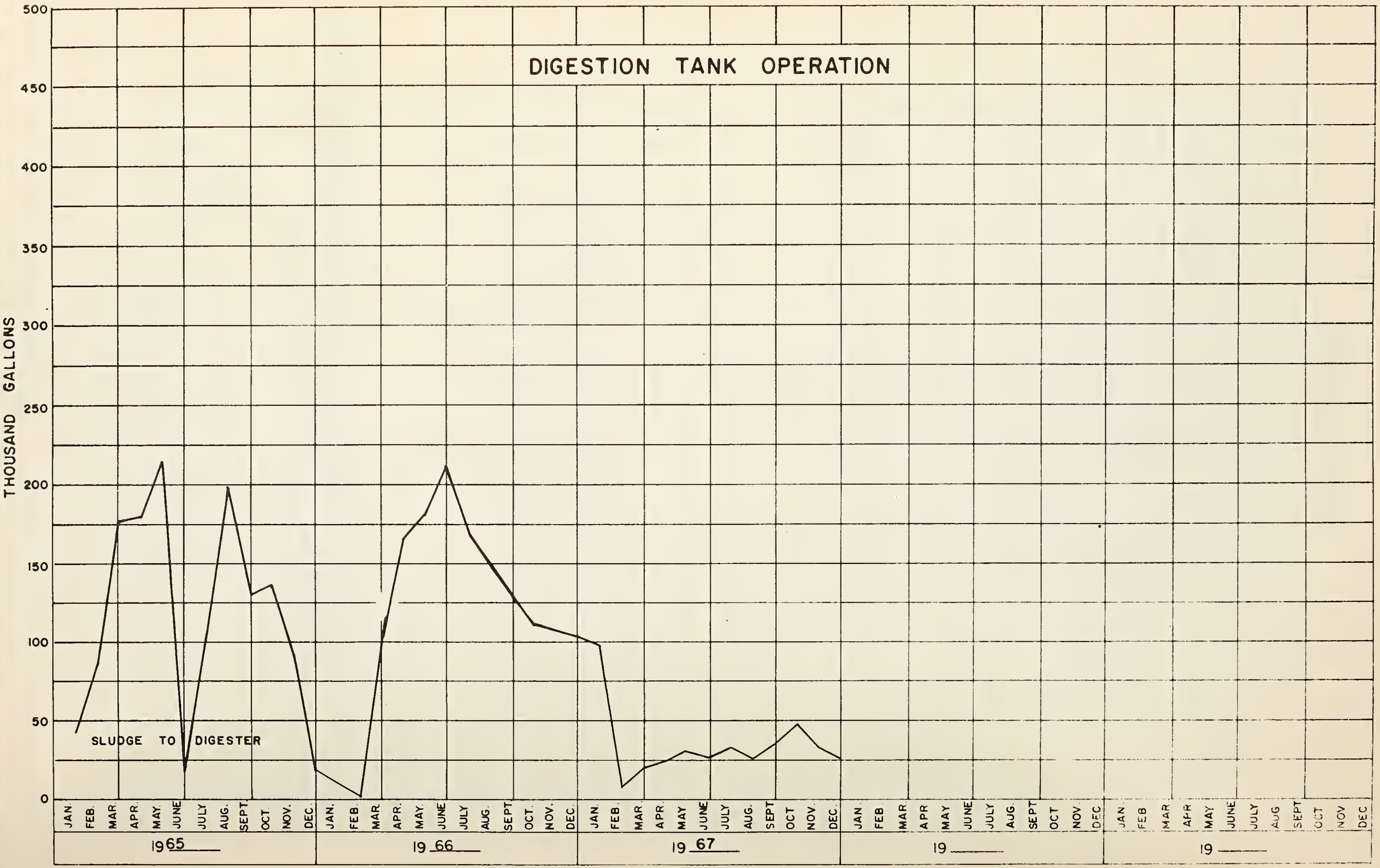
AERATION TANK LOADING
LBS BOD TO AERATION X 1000
MLSS X 50
LBS. BOD
MLSS
5200
6100
0
10
20
30
40
50
60
70
80
90
100
JAN. FEB MAR APR. MAY JUNE JULY AUG SEPT OCT NOV. DEC.
19 65
19 66
19 67
19
19

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.
JANUARY	303	4028	12
FEBRUARY	336	3774	16
MARCH	252	3708	21
APRIL	203	4447	18
MAY	269	4696	11
JUNE	158	4466	8
JULY	189	3725	11
AUGUST	165	3941	6
SEPTEMBER	154	3988	6
OCTOBER	238	3878	14
NOVEMBER	214	3386	16
DECEMBER	179	5476	10
TOTAL	-	49513	-
AVERAGE	221	4126	12

COMMENTS

Difficulty was experienced throughout the year in maintaining a healthy activated sludge in the aeration section. The problem can be attributed directly to industrial wastes from UniRoyal Limited. On at least one occasion during the year, a plant upset has occurred because of toxic wastes from the company.



DIGESTION TANK OPERATION

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS		
	GALLONS	% SOLIDS	% VOL. MAT	GALLONS	% SOLIDS	% VOL. MAT
JAN	98367	1. 6	50	-	. 6	44
FEB	7061	7. 6	61	-	. 5	33
MAR	19956	9. 9	56	10109	. 5	46
APR.	23646	-	-	-	-	-
MAY	29842	5. 2	71	-	-	-
JUNE	26256	6. 0	60	-	-	-
JULY	33422	4. 0	63	-	-	-
AUG.	25459	5. 1	62	-	-	-
SEPT.	34896	4. 9	65	-	-	-
OCT.	47376	6. 2	62	-	-	-
NOV.	33440	7. 3	59	-	-	-
DEC.	26347	5. 9	62	-	-	-
TOTAL	406068	-	-	10109	-	-
AVG.	33839	5. 8	61	-	. 5	41

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M.)
JANUARY	15.863	472	2.97
FEBRUARY	14.916	434	2.91
MARCH	28.016	465	1.66
APRIL	34.851	496	1.42
MAY	17.976	472	3.15
JUNE	20.809	453	2.17
JULY	19.463	* 460	2.37
AUGUST	12.290	452	3.68
SEPTEMBER	14.955	452	3.02
OCTOBER	21.839	496	2.27
NOVEMBER	23.667	464	1.96
DECEMBER	28.904	509	1.76
TOTAL	253.549	5625	-
AVERAGE	21.129	469	2.45

* Chlorination for 30 days

COMMENTS

A total of 5,625 pounds of chlorine was required to chlorinate the final effluent during the year. The average dosage rate to maintain a chlorine residual of 0.5 ppm for a contact period of 15 minutes was 2.45 ppm.

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CONCLUSIONS

The plant, once again, was unable to meet OWRC objectives for final effluent quality. This poor treatment is attributed to toxic industrial wastes from UniRoyal Limited.

The average daily flows were slightly greater than the design capacity of 0.680 mgd. The increased flows over the previous year were due to increased storm flows and infiltration to the municipal sewer system.

RECOMMENDATIONS

In order to improve the treatment efficiency of the plant to meet OWRC objectives, the following recommendations are made:

1. The Town of Elmira should endeavour to reduce storm flows and infiltration to the municipal sewer system.

2. UniRoyal (1966) Limited should only discharge wastes to the treatment plant that are amenable to biological treatment.

DATE DUE

TD
367
.A56
E455
1967

Elmira : water pollution control plant.
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